

predetermined wavelength, characterised in that the means (20,21) for causing the partial reflections locates the reflecting locations (20) along the optical path (15) at distances from the first end (8) along the optical path (15) which are functions of the effective optical length of the optical path (15) taking account of alteration to the actual length of the optical path (15) resulting from the affect of the means (20,21) for causing the partial reflections on the actual length of the optical path (15).

74. An optical waveguide as claimed in Claim 73 characterised in that the means (20,21) for causing the partial reflections of the light at the at least two reflecting locations (20) comprises a refractive index altering means (21) for altering the effective refractive index of the light conducting medium (2) presented to light passing along the optical path (15) at each of the at least two reflecting locations (20) for causing the partial reflections.

75. An optical waveguide as claimed in Claim 74 characterised in that the length of each reflecting location (20) in the longitudinal direction of the optical path (15) is relatively short, and preferably, the length of each reflecting location (20) in the longitudinal direction of the optical path is in the range of 0.3 microns to 200 microns, and advantageously, the length of each reflecting location (20) in the longitudinal direction of the optical path is in the range of 1 micron to 4 microns.

76. An optical waveguide as claimed in Claim 75 characterised in that the respective lengths of the reflecting locations (20) along the optical path may be the same or different, and

the effective refractive indices of the respective reflecting locations (20) may be the same or different.

77. An optical waveguide as claimed in Claim 74 characterised in that the distance of each reflecting location (20) from the first end (8) along the optical path is a function of the product of the actual length of the optical path (15) and the actual refractive index of the light conducting medium (2) defining the optical path, less the sum of the products of the lengths of the reflecting locations (20) and the differences between respective effective refractive indices of the reflecting locations (20) and the actual refractive index of the light conducting medium defining the optical path (15), and preferably, the distance of each reflecting location (20) from the first end along the optical path is a function of the sum of the products of the lengths of the reflecting locations (20) intervening between the first end (8) and that reflecting location (20) and the differences between respective effective refractive indices of the reflecting locations and the actual refractive index of the light conducting medium defining the optical path, and advantageously, the distance of each reflecting location (20) from the first end (8) along the optical path (15) is a function of the product of half the length of that reflecting location and the difference between its effective refractive index and the actual refractive index of the light conducting medium defining the optical path, and ideally, the distance of each reflecting location from the first end (8) along the optical path (15) is a function of the actual refractive index of the light conducting medium (2) defining the light path (15).

78. An optical waveguide as claimed in Claim 74 characterised in that the distance of the p^{th} reflecting location (20) from the first end (8) along the optical path (15) is provided by the formula:

$$L = \frac{X \left\{ L_{\text{device}} n_{\text{device}} - \sum_i I_i \Delta n_i \right\} + \sum_{i=1}^{p-1} I_i \Delta n + \frac{1}{2} I_p \Delta n_p}{n_{\text{device}}}$$

where: L is the distance of the p^{th} reflecting location from the first end along the optical path, X is the fraction of the actual optical length at which the element is to be placed, L_{device} is the actual length of the optical path, n_{device} is the average refractive index of the light conducting layers of the unperturbed light conducting medium of the optical path presented to the light, I_i is the length of the i^{th} reflecting location in the direction of the optical path, Δn_i is the difference between the effective refractive index of the i^{th} partial reflecting location and the average refractive index of the unperturbed optical path, I_p is the length of the p^{th} reflecting location in the direction of the optical path, and Δn_p is the difference between the effective refractive index of the p^{th} partial reflecting location and the average refractive index of the optical path.

79. An optical waveguide as claimed in Claim 74 characterised in that the refractive index altering means (21) comprises a plurality of refractive index altering elements (20) one refractive index altering element being provided for each reflecting location, the respective refractive index altering elements being located distances from the first end along the optical

path similar to the distances from the first end of the corresponding reflecting location, and preferably, each refractive index altering element (21) is located spaced apart from an active region within which the optical path is defined.

80. An optical waveguide as claimed in Claim 79 characterised in that each refractive index altering element (21) is provided by a refractive index altering groove (21) formed in a medium adjacent the light conducting medium but spaced apart therefrom, and the depth of the refractive index altering grooves (21) may be the same or different, and preferably, each refractive index altering element (20) extends substantially transversely relative to the optical path (15).

81. An optical waveguide as claimed in Claim 74 characterised in that the respective reflecting locations (20) are formed by a dopant, and the distance from the first end along the optical path to each reflecting location is measured to the centre of the reflecting location.

82. An optical waveguide as claimed in Claim 73 characterised in that the optical waveguide is a waveguide for laser light, and may be a semiconductor laser light generating device, and may be a passive semiconductor waveguide.

83. An optical waveguide as claimed in Claim 82 characterised in that a ridge (14) is formed on a surface of the semiconductor laser waveguide for defining the optical path through the light conducting medium, and preferably, the refractive index altering elements (21) are located in the ridge (14) at locations corresponding to the reflecting location, and

advantageously, the refractive index altering elements (21) are located in the ridge (14) at locations directly corresponding to the partial reflecting location (20).

84. An optical waveguide as claimed in Claim 82 characterised in that the optical waveguide is a buried heterostructure laser, and may comprise a fibre optic waveguide.

85. An optical waveguide as claimed in Claim 74 characterised in that the waveguide is a filter comprising an optical fibre core which forms the light conducting medium for defining the optical path, the optical fibre core being surrounded by cladding medium of refractive index different to that of the optical fibre core, and preferably, each refractive index altering element (20) is located in and extends around the cladding medium.

86. An optical waveguide as claimed in Claim 73 characterised in that the means (20,21) for causing the partial reflections causes the partial reflections at at least three reflecting locations (20) along the optical path (15), and preferably, the reflecting locations (20) are provided at respective distances from the first end which correspond to the following fractions of the actual length of the optical path, namely, $1/14$, $1/7$, $3/14$, $2/7$, $3/7$, $4/7$ and $5/7$ along the optical path.

87. An optical waveguide as claimed in Claim 86 characterised in that the respective distances along the optical path from the first end at which the reflecting locations are located which correspond to the fractions of the actual length of the optical path of $1/14$, $1/7$, $3/14$, $2/7$, $3/7$, $4/7$ and $5/7$ are 39.3, 78.6, 118.0, 157.3, 235.9, 314.5 and 393.1 microns for a waveguide of actual length of 550 microns, or reflecting locations (20) are provided at respective distances

from the first end which correspond to the following fractions of the actual length of the optical path, namely, $1/16, 1/8, 3/16, 1/4, 5/16, 3/8, 1/2, 5/8$ and $3/4$ along the optical path, or the respective distances along the optical path from the first end at which the reflecting locations are located which correspond to the fractions of the actual length of the optical path of $1/16, 1/8, 3/16, 1/4, 5/16, 3/8, 1/2, 5/8$ and $3/4$ are 18.74, 37.55, 56.36, 75.16, 93.97, 112.78, 150.26, 187.74 and 225.23 microns for a waveguide of actual length of 300 microns.

88. An optical waveguide as claimed in Claim 74 comprising a plurality of optical waveguides provided in the form of an array (50), and preferably, the wavelength of the light outputted from the respective waveguides of the array may be the same or different.

89. An array of optical waveguides characterised in that the respective optical waveguides of the array are optical waveguides as claimed in Claim 74.

90. A method for providing an optical waveguide for outputting light of a substantially single predetermined wavelength, the method comprising providing a light conducting medium (2) defining a longitudinally extending optical path (15) for guiding the light, the optical path (15) extending longitudinally between respective spaced apart first and second ends (8,9), and providing a means (20,21) for causing partial longitudinal reflections of the light along the optical path (15) at at least two spaced apart partial reflecting locations (20) along the optical path for deriving the light of the predetermined wavelength, characterised in that the means (20,21) for causing the partial reflections are provided such that the reflecting locations (20) are at distances from the first end (8) along the optical path (15) which are

functions of the effective optical length of the optical path (15) taking account of alteration to the actual length of the optical path (15) resulting from the affect of the means (20,21) for causing the partial reflections on the actual length of the optical path (15).

91. A method as claimed in Claim 90 characterised in that the means (20,21) for causing the partial reflections of the light at the at least two reflecting locations (20) is provided by a refractive index altering means (21) for altering the refractive index of the light conducting medium (2) presented to light passing along the optical path (15) at each of the at least two reflecting locations (20) for causing the partial reflections.

92. A method as claimed in Claim 91 characterised in that the length of each reflecting location (20) in the longitudinal direction of the optical path (15) is relatively short, and preferably, the length of each reflecting location (20) in the longitudinal direction of the optical path is in the range of 0.3 microns to 200 microns.

93. A method as claimed in Claim 91 characterised in that the respective lengths of the partial reflecting locations along the optical path may be the same or different, and the effective refractive index of the respective reflecting locations may be the same or different.

94. A method as claimed in Claim 92 characterised in that the distance of the p^{th} reflecting location (20) from the first end (8) along the optical path (15) is provided by the formula:

$$L = \frac{X\{L_{\text{device}}n_{\text{device}} - \sum_i l_i \Delta n_i\} + \sum_{i=1}^{p-1} l_i \Delta n_i + \frac{1}{2}l_p \Delta n_p}{n_{\text{device}}}$$